DOCUMENT RESUME

ED 042 716 24 SP 004 162

AUTHOR	Smith, Marilyn M.; And Others
TITLE	Getting Pupils to Use a Variety of Mental Operations, Appendix H. Vol. II, A Plan for Managing the Development, Implementation and Operation of a Model Elementary Teacher Education Program.
INSTITUTION	Oregon Coll. of Education, Monmouth.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-9-0506
PUB DATE	Feb 70
CONTRACT	OEC-0-9-470506-4039(010)
NOTE	21p.
AVAILABLE FROM	Supt. of Docs., Government Printing Office, Washington, D.C. 20402 (HE5.87: M72/V2, Appendixes A-P, $2.25)
EDRS PRICE	EDRS Price MF-$0.25 HC-$1.15
DESCRIPTORS	Abstracting, *Cognitive Development, Divergent Thinking, *Effective Teaching, *Elementary School Teachers, Evaluative Thinking, Foundation Programs, Laboratory Training, Learning Experience, Learning Processes, Memory, Practicums, *Teacher Education, *Teacher Education Curriculum, Teacher Orientation
IDENTIFIERS	CETEM, *Comprehensive Elementary Teacher Education Models

ABSTRACT

One competency to be demonstrated by future teachers in the OCE ComField program is defined in terms of their ability to bring about a wide range of cognitive responses on the part of pupils, indicating that the pupil is using a variety of mental operations, which include divergent thinking memory, evaluative thinking, and identifying common properties or abstracting. The program identifies conditions believed to influence the student's learning outcome as 1) instructional strategies; 2) situational variables; 3) learner characteristics; and 4) the content carried by the instructional strategies. Learning experiences are then designed to enable teachers to establish these conditions. The demonstration of competence under either laboratory or practicum conditions requires evidence that all of the conditions that influence the learning process in pupils can be put together in such a way that the outcomes desired for pupils can be achieved. The examples of learning experiences discusses include orienting experiences, foundation exercises, laboratory exercises, and practicum experiences. Related documents are SP 004 155 to SP 004 161 and SP 004 163 to SP 004 166.

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APPENDIX H

AN EXAMPLE OF AN INSTRUCTIONAL SYSTEM

SP004162

GETTING PUPILS TO USE A VARIETY OF MENTAL OPERATIONS

An Example of An Instructional Management Competency, The Learning Experiences Designed to Bring It About, and The Measures Used to Assess Its Realization

Marilyn M. Smith
George Peabody College

Victor E. Lund
Ralph A. Farrow
Robert E. Albritton
Oregon College of Education

H. Del Schalock
Teaching Research

Introduction

One competency to be demonstrated by future teachers in the OCE ComField based program is defined in terms of the student's (future teacher's) ability to bring about a wide range of cognitive responses on the part of pupils. These responses are to be viewed as indirect indicators that the pupil is using a variety of mental operations.

Defining the demonstration of the competency in terms of pupil responses places key importance on the means that will be used to define and measure pupil responses. The means for obtaining specific definitions in this exemplar is to refer to a variety of existing conceptualizations about types of thinking. When these are made explicit they can be used as the "operation definitions" upon which instructional experiences for students and measures of pupil responses can be developed. Some examples of the conceptualizations used in the present example, and the authors from which they derive are:

> Pupils practice divergent and evaluative thinking as well as convergent thinking, cognition and memory [Guilford].
>
> Thinking operations can be defined as description, explanation, evaluation-justification, evaluation-matching, and expansion [Gallagher].

Pupils search for relationships, organize information to make inferences and explanations [Taba].

Pupils engage in a variety of operations, such as: comparing, summarizing, observing, classifying, interpreting, criticizing, looking for assumptions, imagining, etc. [Raths, Wassermann, Jonas, Rothstein].

Inherent in the above examples of conceptualizations of types of thinking is a reliance on pupils' overt responses to serve as indicators of probable covert mental operations. The examples which follow describe overt activities which could be predictors of different mental operations as they have been conceptualized by Guilford.

overt activity	covert mental operation
Pupil generates new information from known information; pupil generates a variety of possible solutions to a problem.	divergent thinking
Pupil recites or writes specific information previously presented to him.	memory
Pupil states a judgment or decision about the goodness or correctness of an event and gives his criteria for the judgment.	evaluative thinking
Pupil groups objects or pictures into sets.	identifying common properties, abstracting

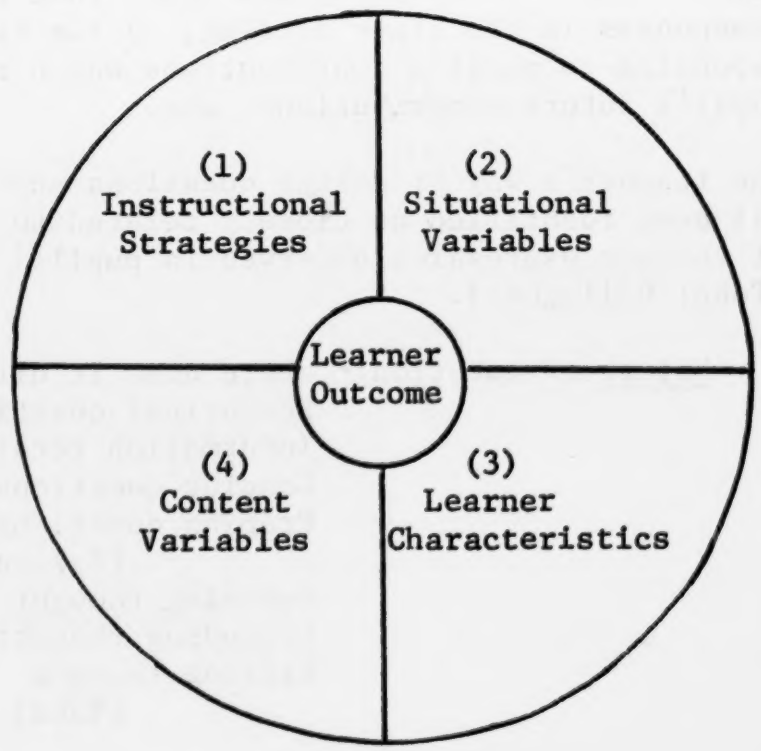
Other sets of relationships between overt activities and covert mental operations could be defined for other conceptualizations of mental operations. Whichever set of definitions of overt activities are preferred, they become the basis for measuring the student's competence in working with pupils.

A program that requires students to demonstrate specified competencies must take responsibility for designing and implementing experiences to assist students attempting to achieve the competencies. A ComField based instructional program approaches this responsibility by first identifying conditions thought to have an important influence on pupils' demonstrations of the desired mental operations, and then designing learning experiences for prospective teachers that prepare them to be able to establish those conditions. Four sets of conditions are always interacting to affect any learning outcome: 1) instructional strategies, 2) situational variables, 3) learner characteristics,

and 4) the content carried by the instructional strategies.[1]

Figure 1

Conditions Influencing Learner Outcome



[1] For a detailed description and statement of the interaction between these variables in the teaching-learning process, see Schalock, H. D. "Learner Outcomes, Learning Processes and the Conditions of Learning" (pp. 53-70) In The Contribution of the Behavioral Sciences to Instructional Technology. Monmouth, Oregon: Teaching Research, A Division of the Oregon State System of Higher Education, 1968.

Having specified the conditions that influence learning in pupils generally, the next task is to specify the specific instructional conditions that relate to the specific outcomes desired in pupils (in this case a variety of mental operations). Once this has been done the final task is to develop the learning experiences that will enable prospective teachers to create the specific conditions needed to effect the specific outcomes desired in pupils. Some examples of the conceptual frameworks that prospective teachers might be required to master in developing competence in exercising a variety of mental operations in pupils are listed below.

(1) Instructional Strategies: Many instructional strategies are thought to be related to the patterns of thought expression observed in pupils' responses, e.g., a) the teacher's way of formulating questions, b) the teacher's ability to build an emotional climate of security and trust that frees pupils to make responses in the class setting, c) the teacher's pattern of responding to pupil's contributions which can influence the pupil's future contributions, etc.

a) The teacher's way of asking questions and posing problems has been identified as closely related to the patterns of thought expression observed in pupils' responses [Taba; Gallagher].

- Nature of question: Where does it direct thought?
  Rhetorical questions
  Information recall questions
  Leading questions
  Probing questions
  [Parsons & Shaftel]
  Focusing thought
  Extending thought
  Lifting thought
  [Taba]

- Appropriateness of question: Is it manageable by a particular learner? The teacher pays special attention to the sequencing of questions and problems in order to come closer to achieving a "match" between pupils adapted understandings and new stimuli, e.g., simple and concrete cognitive operations precede more complex and abstract ones. [Taba]

- Pacing of questions: Is the teacher's timing in tune with the learner's momentum?

b) "Security building strategy" to facilitate the pupils' giving responses in the classroom [Thelen].

- First confrontation with the event, issue, or problem is an individual confrontation. Task would include some form of making notes to self, appropriate time would be allowed and individual should reach a tentative resolution.

- Second confrontation with the event, issue, or problem is a small group (3-5) confrontation. Each individual tests his ideas; practices what he has been thinking. This should result in further refined resolutions.

- Third confrontation is in a large group.

(2) Situational Variables: The physical context and group structure in a classroom are important conditions in pupils' use of a variety of mental operations. The teacher who is sensitive to these influences at work can become involved in attempts to manage them to the advantage of achieving the desired objective.

a) Since the objective requires pupil responses, many opportunities for responding must be available, thus the need for teacher-pupil discussions in groups of (8-12), and pupil-pupil discussions in groups of (2-6). Materials, equipment, room arrangement, and pupil groups can be strategically organized to allow for individual and small group work to occur simultaneously with a minimum of interference for each other.

b) The set of standards for classroom behavior during multiple activity periods is a prime factor in creating an atmosphere conducive to productive individual and group work.

(3) Learner Characteristics: Individual characteristics of the learners play a very important role in the types of responses that pupils contribute. The teacher's degree of sensitivity to these differences will be related to his ability to individualize expectations and experiences for each pupil.

a) The overt responses of learners involve a wide variance in characteristics which suggest varying types of covert mental operations. Teachers need to be skilled in recognizing these varying characteristics of overt responses.

b) The following questions point to the individual characteristics of learners that teachers should diagnose in order to effectively create conditions that stimulate a variety of mental operations.

- What is the learners degree of familiarity with a topic?
- What topics have relevance and interest to a learner?
- What are a learner's resources for independent pursual of information, solutions?
- How adequate are the learners verbal skills for questioning, interpreting, responding with his classmates?

(4) The Content Carried by the Instructional Strategy: A teacher's understanding of the structure of the content being studied is related to his ability to organize and present problems and activities in a variety of ways and to stimulate different responses from the pupils, e.g., to stimulate divergent or convergent thinking.

If a teacher's understanding of history is limited to viewing it as a set of chronological ordering of events to be memorized, it is likely that his approach with pupils will be to expect recall of a set of ordered events. This teacher would probably not be prepared to help pupils (1) probe the variety of ways historians try to establish an ordering or even happening of events and (2) use convergent, divergent and evaluative thinking to see what conclusions they (the pupils) might pose.

Obviously the examples given of the conditions thought to influence mental operations is far from complete. As much detail as our knowledge permits needs to enter planning at this point and it is a level of detail that must be continuously increased and updated as our knowledge of the teaching-learning process grows. However, the set of conditions available at any point in time stated as conceptualizations and performances, become the basis for designing instructional experiences for prospective teachers attempting to demonstrate competency in creating the conditions necessary to bringing the desired learner outcomes about.

In designing learning experiences that will permit prospective teachers to effectively combine the various sets of conditions needed to bring about a given pupil outcome three levels of experience are provided: 1) that which leads to mastery of the individual conceptual frameworks or instructional operations that are required in combination

to bring about a given pupil outcome; 2) that which leads to the effective combination of the individual conceptual frameworks and instructional operations mastered at level one under simplified instructional conditions; and 3) that which leads to the effective combination of individual conceptual frameworks and instructional operations under real-life instructional conditions. Experiences leading to the mastery of individual components in the teaching act are obtained in the FOUNDATIONS thread of the curriculum; experiences leading to an effective synthesis of the individual components under simplified conditions are obtained in the LABORATORY thread of the curriculum; and experiences leading to an effective synthesis under real-life conditions are obtained in the PRACTICUM thread of the curriculum. Experiences designed to orient the prospective teacher to that which is to be mastered are provided at each level of instruction. Figure 2 depicts some of the specific conceptual frameworks and instructional operations around which foundation level instructional experiences are to be provided.

Figure 2

Examples of Individual Conceptual Frameworks and Instructional Operations to be Mastered in the Foundations Thread of the Proposed Teacher Education Program.

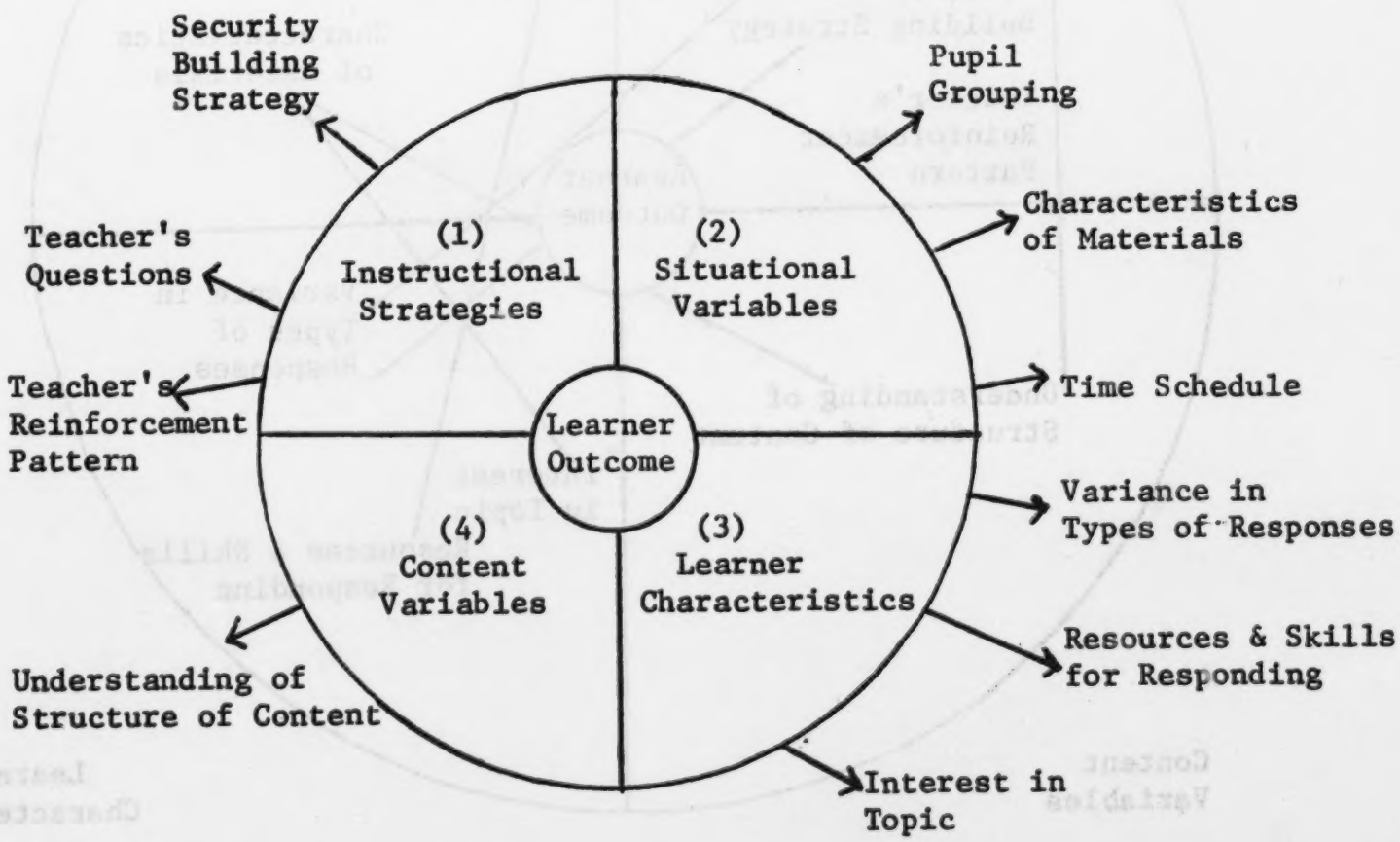
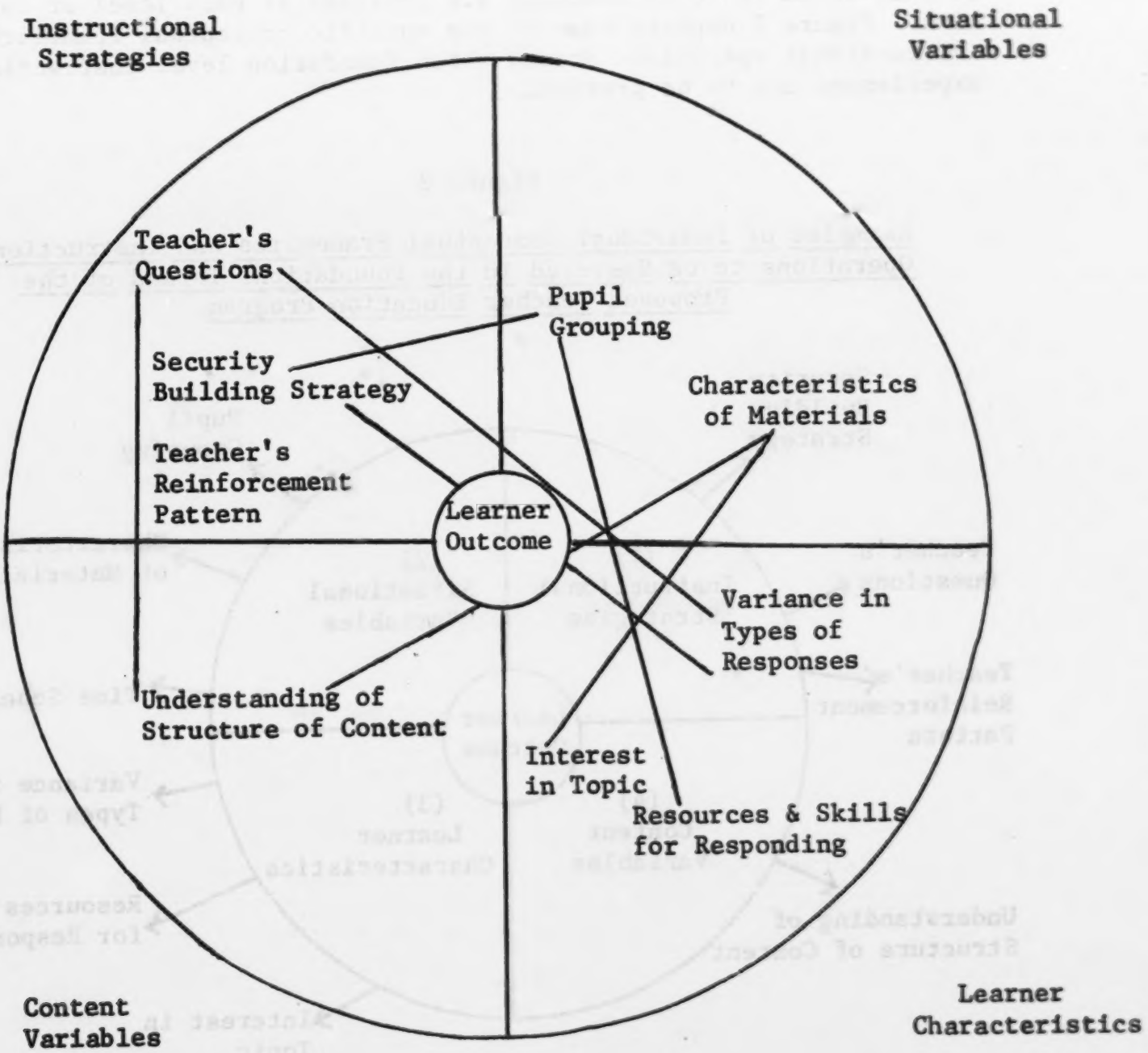


Figure 3 depicts the way in which the individual components of the teaching act begin to be related to one another in the LABORATORY thread of the program, and thereby begins to approach the complexity that characterizes the teaching-learning process under real-life conditions.

Figure 3

Examples of the Kinds of Linkages to be Established in the LABORATORY Thread of the Curriculum Between the Various Components Involved in the Teaching Acts



The demonstration of competence under either laboratory or practicum conditions requires evidence that all of the conditions that influence the learning process in pupils can be put together in such a way that the outcomes desired for pupils can be achieved.

Examples of Learning Experiences To Be Pursued By Prospective Teachers in Developing Competence in Exercising Various Mental Operations in Pupils

1:00.00 ORIENTING EXPERIENCES

The following activities are designed to facilitate students' sensitization to the variety of mental operations suggested by different types of pupil responses. These orienting experiences are also meant to help students make decisions about if, when, and how they will engage in activities in preparation for the demonstration of this particular competency. These experiences should at least make available to the sponsor and student some common referents and definitions for their use as they begin negotiations concerning the student's intentions and plans relative to the competency.

Activities

1:21
Several examples of teachers demonstrating the competency are presented in a film which is readily available for viewing by individuals. In addition to models demonstrating the competency analytic descriptions of the major conditions thought to be related to the achievement of the desired learner outcome would be provided. The film might also include examples of instructional experiences available for use by students in the foundation, laboratory, and practicum settings that relate to the competency. Finally, definitions of key terms used in the film would be available.

1:22
Students might attend a lecture about the competency, and at the lecture film clips illustrating examples of ways pupils respond to thought-provoking stimuli would be presented. Pupil responses acceptable as indicators of the type of covert thinking operation desired would be pointed out. The film clips could also contain examples which show that different kinds of thinking serve different purposes for different children.

1:23
Students observe a classroom in School X where teacher A is conducting a lesson designed to enable students to use "Divergent Productive Thinking," on Day Y, Time Z.

1:24
Students observe and record responses in School X where teacher B is conducting a lesson on Day Y, Time Z. They record responses to provide a basis for a conference with the Sponsor and 5 other students on day X in relation to the competency.

2:00.00
FOUNDATION EXERCISES

The following exercises are designed to help students conceptualize and/or perform acts related to broad, single categories of conditions thought to be related to teachers helping pupils use a variety of mental operations, e.g., levels of thinking, questioning strategies, sensitivity to variance in pupil response.

An Example of a Specific Conceptual Framework to be Mastered

"Variance in types of pupils' responses"

Activities	Indicators
2:21.1 Students read a selection which describes Gallagher's conceptualization of levels of thinking. In small groups, they discuss the categories presented in the selection. They then (in small groups) take a sample of pupil responses and match them with the categories presented in the reading selection. Stimulus form: Symbolic	2:21.2 Students list and define pupil responses using Gallagher's model of levels of thinking. Stimulus form: Symbolic Indication of: Responding with Knowledge
2:22.1 Students view a film which shows pupils responding with various levels of thinking. Stimulus form: Simulated	2:22.2 Students identify pupil responses by placing them in appropriate categories corresponding to levels of thinking. Stimulus form: Simulated Indication of: Responding with Comprehension

2:23.1
Students observe real students engaged in a discussion and producing responses that suggest use of a variety of levels of thinking.

Stimulus form: Real

2:23.2
Students identify pupil responses by placing them in appropriate categories corresponding to levels of thinking.

Stimulus form: Real
Indication of: Responding with Comprehension

2:24.1
Students in discussion groups produce other examples of pupil responses which fit in the categories of thinking described in the Gallagher reading selection.

Stimulus form: Symbolic

2:24.2
The student generates (lists) at least ten different responses in each category of thinking.

Stimulus form: Symbolic
Indication of: Responding with Comprehension

2:25.1
Students work through a mini-program which describes the three cognitive tasks included in Taba's teaching strategies.

Stimulus form: Symbolic

2:25.2
Student reorders pupil response sets into another set.

Stimulus form: Symbolic
Indication of: Responding with Comprehension

2:26.1
Students discuss with their sponsors, their feelings and interests with respect to their activities in studying about ways that pupils might demonstrate a variety of mental operations.

Stimulus form: Real

2:26.2
Student states feelings and commitment either in written or oral form.

Stimulus form: Real
Indication of: Responding with Evaluation

Another Example of a Specific Conceptual Framework to be Mastered

"Security Building Instructional Strategies"

The purpose of this series of exercises is to help students conceptualize and perform strategies whose intent is to create a degree of security and trust that may enable pupils to make responses in the classroom setting. This specific condition is derived from Thelen's conceptualization of "security building strategies."

Activities	Indicators
2:27.1A Students view a film (to be developed) which will depict a teacher introducing a new topic for discussion to a classroom of pupils. The film will portray at least the following events. The topic holds interest for most pupils in the room (indicated by their attention when topic is first introduced). The teacher uses interesting materials that have relevance to the topic. After the teacher completes the introduction, he asks some evaluation type questions of the students and says they are to accompany their remarks with the criteria they used to arrive at their conclusion. The responses from the pupils is minimal and superficial. Stimulus form: Simulated This basic "simulated" stimulus event is followed by a series of possible activities designed to direct the students toward responding and valuing activity. While these activities are presented in "symbolic" form, they relate back to the "simulated" stimulus. There is also a "real" element involved, for the student going through these activities will experience a form of a "security building strategy."	
2:27.1B Student provides probable reasons why the responses of the pupils in the film were minimal and superficial. The directions for this task direct the students'	

attention to (a) how the task might have been perceived by the pupils, (b) the feasibility of responding to the task in the manner in which it was presented, and (c) suggestions for changes in the teacher's strategy.

2:27.1C
Student compares his evaluations and suggestions with 4 to 6 other students who are participating in the same activity.

2:27.1D
Student reads reference material on "security building strategies" by Thelen.

2:27.1E
Student discusses the meaning, interpretations and implications of Thelen's writing with the same small group of students he worked with in 1C above.

2:27.1F
The students may call in an instructor to discuss security building strategies with their small group.

2:27.1G
Student writes plans for a strategy he would like to try if he were the teacher working with the pupils, objectives and materials depicted in the film.

2:27.1H
Student writes his personal feelings and evaluation of his personal experience of a "security building instructional strategy" in the above series of activities.

2:27.2A
Student lists and defines "security building strategies" as conceptualized by Thelen.

Stimulus form: Symbolic
Indication of: Responding with Knowledge

2:27.2B
Student writes a description of how the instructional strategies in the film would be changed to be more congruent with Thelen's conceptualization of "security building strategies."

Stimulus form: Symbolic & Simulated
Indication of: Responding with Comprehension

2:27.2C
Student views a film depicting a teacher introducing a topic to pupils. The film cuts at the point when the teacher is ready to use strategies to stimu-

late responses from the pupils. The student gives immediate verbal responses as if he were carrying on for the teacher in the film. His responses are evaluated using Thelen's criteria for "security building strategies."

Stimulus form: Simulated
Indication of: Responding with Application

2:27.2D
Student evaluates his feelings about his own personal experiencing of an instructional strategy derived from Thelen's notion of "security building" and writes them in a report.

Stimulus form: Real
Indication of: Evaluation

2:27.2E
Student has negotiating conferences and makes a decision about commiting himself to practicing, in a micro-teaching setting, this and/or other security building strategies.

Stimulus form: Real
Indication of: Evaluation

3:00.00
LABORATORY EXERCISES

The following exercises are designed to help students conceptualize and practice synthesizing a variety of conditions interacting to influence the quantity and quality of learner responses.

An Example of the Conceptual Framework to be Integrated

"Variance in types of pupils' responses"
"Variance in teachers' questioning strategies"

Activities	Indicators
3:21.1 Given a typescript which includes teacher questions and pupil responses, the student will specify patterns of teacher question - pupil response relationships. Stimulus form: Symbolic	3:21.2 Student can describe relationships between teacher questions and pupil responses. Stimulus form: Symbolic Indication of: Responding with Analysis
3:22.1 In a role play situation where the actors are used to respond in predetermined ways, the student will practice questioning techniques which are intended to produce varying levels of thinking on the part of the role-playing actors. Stimulus form: Simulated	3:22.2 Student can identify levels of pupil response shown by the actors in the role-playing situation and use questions intended to promote various levels of response. Stimulus form: Simulated Indication of: Responding with Application
3:23.1 In a micro-teaching situation with real pupils, the student will practice questioning techniques which are intended to produce varying levels of thinking on the part of the pupils. Stimulus form: Real	3:23.2 Student can identify levels of pupil response and can use questions intended to promote various levels of response. Stimulus form: Real Indication of: Responding with Application
3:24.1 Student will develop questions that are designed to lead to "open" or "closed" responses and (A) write the expected responses, (B) use the questions in a simulated classroom setting, or	3:24.2 Student can compose questions that could be classified in different categories and can obtain "open" and "closed" responses with these questions.

(C) test the questions with a small group of pupils.

Stimulus form: Simulated

Stimulus form: Simulated
Indication of: Responding with Analysis

Another Example of the Conceptual Framework to be Integrated

(content) "understanding map skills"
(learner characteristics) "characteristics of convergent responses"
(instructional strategies) "convergent type questions"

Activity	Indicators
3:25.1 Given a small group of pupils, the student develops and conducts a micro-teaching lesson which requires pupils to locate and identify points on a map. Stimulus form: Real	3:25.2 Student provides data and procedures which pupils need to locate on a map. Student also shows evidence that he can organize and make available the material needed by pupils. Student analyzes pupils' responses to see if they in fact can locate points on a map. Stimulus form: Real Indication of: Responding with Application

Another Example of the Conceptual Framework to be Integrated

(instructional strategies) "teachers' questions"
"teachers' reinforcement patterns"
(situational variables) "organization of room, pupils, and time schedule"
(content) "content of discussion"
(learner characteristics) "general behavior and specific verbal responses of learners"

Activities	Indicators
3:27.1A Student views a series of film clips (to be developed), each depicting a teacher guiding a discussion with a classroom of learners (some clips will show adult learners, some child learners). Each film clip will in-	3:27.2A Student lists conditions he identifies in the film which he proposes are influencing the quantity and quality of learner responses. This list is compared with

clude information about the conditions listed above. Each film clip will purposefully vary the qualities of these various conditions.

Stimulus form: Simulated

This basic "simulated" stimulus event is accompanied with a series of activities presented in "symbolic" form.

3:27.1B
The student is to order, along a continuum, the conditions influencing the learner responses in each film clip. The ordering is to precede from those conditions that most need modifying to those in least need of modification.

3:27.1C
The student may compare his orderings, from the above activity, with the orderings of 4 to 6 other students and an instructor. This setting and task will provide opportunity for discussion of the interacting conditions influencing learners' responses.

3:27.1D
The student may choose and read selections from a bibliography of references related to the conditions that were varied in the film clips.

3:27.1E
The student may participate in discussions with an instructor and a few students who have also been reading and thinking about ways in which conditions interact to influence learner responses.

a list compiled by a panel of "experts."

Stimulus form: Simulated
Indication of: Responding with Analysis

3:27.2B
The student orders, along a continuum, the conditions influencing the learner responses in each film clip. Each ordering is to precede from those conditions that most need modifying to those in least need of modification. The student's orderings are compared with a panel of "experts." When there is a major difference between the student's

and the panel's orderings for a particular film clip, the student prepares a rationale to support his ordering and presents it for consideration by the panel.

Stimulus form: Simulated & Symbolic
Indication of: Responding with Synthesis

Examples of Criterion Competence Measures in the Laboratory Setting

As indicated previously, competence, in the sense it is used within the ComField model, refers to the ability of prospective teachers to demonstrate that they are able to bring about specified outcomes in a specified child or group of children. Given such a definition, the demonstration of competency has two features about it that are relatively foreign to the thinking of teacher education: a) competence is always situation specific, that is, it involves the realization of a given outcome for a given child or group of children in a given setting, and b) it is defined in terms of pupil behavior rather than teacher behavior. Examples of criterion competency measures within the laboratory setting are as follows:

Given a group of (#) (type) pupils, the student will conduct a learning experience in the area of (content) lasting approximately (30 min.). The pupil's responses during this period will indicate varied patterns of thought, e.g., memory, convergent, divergent, and evaluative thinking. The learning experience will be tape recorded and pupil responses will be classified according to the following categories: memory, convergent, divergent, and evaluative thinking. This classification must meet the criteria of showing

a minimum of (15%) evaluative
a minimum of (25%) divergent, and
a minimum of (30%) convergent thinking.

Judgments could be made about the appropriateness of the questions for the stated learning objectives for the experience.

Given the opportunity to observe and interact with (#) (type) individual pupils for a period of (time), the student will identify one pupil's limited pattern of responses, specify the type of limitation, and prescribe and implement a plan with the objective of expanding the pupil's pattern of responses in a specified way. The student will supply a written description and a sample recording depicting the nature of the pupil's limited response pattern that is the focus of his prescribed and implemented instruction. At the end of the instructional period he will

supply another written description and sample recording depicting the nature of the pupil's response patterns. Tabulations will be made of changes in the pupil's response patterns.

4:00.00
PRACTICUM EXPERIENCES

The student is testing and synthesizing knowledge, sensitivities and skills that are related to stimulating a variety of mental operations for a total set of children over a period of time. This experience requires diagnostic and prescriptive effort on the part of the student and is accompanied with supervision that gives feedback. In the practicum setting the student is faced with a more rigorous test of his ability to help pupils engage in a variety of mental operations, that is, he is no longer dealing with a micro-situation to demonstrate a micro-performance. Now, the criterion performance requires success with an entire class, over time, while simultaneously encountering many other school tasks and required performances. Following are examples of indicator exercises that will be available to the practicum student and his clinician in developing competency at criterion level.

An Example of Experiences Which Lead to the Synthesis of the Individual Components of the Teaching Act Under Real Life Conditions

4:21.1
Given a group of pupils in the practicum assignment and the objectives of producing pupil behavior which shows the utilization and development of various mental operations, the student will

(A) diagnose pupil differences relative to thinking in a given content area,	(A) The student can use Gallagher or Guilford's categories for defining types of thinking to classify tape recordings of his pupils and thus check his diagnostic conclusions.
(B) prescribe a specific setting and instructional strategy,	(B) Check lists of situational variables and instructional strategies as they are thought to relate to varying learner characteristics can be used by the clinician and practicum student to assess the prescribed instructional plan.

(C) implement the instructional strategy and evaluate his own efforts and the efforts of the pupils in terms of the changes in pupil behavior.	(C) To assess the implementation of the plan, the practicum student can utilize data tape (audio & video) to which he can apply some of the above assessment techniques.

An Example of a Competence Measure in the Practicum Setting

Given the opportunity to work in a classroom of (#) (type) pupils for a period of (# weeks), samples of pupil responses over time and in (#) different content areas will indicate a variety of patterns of thought, e.g., memory, convergent, divergent, and evaluative thinking. The student or his clinician will tape record discussions that he conducts in each of the (#) content areas. Samples from each of the content areas will be analyzed for types of pupil responses to meet minimum of (specify %) in each of the following categories: memory, convergent, divergent, and evaluative. (Note: the minimum percentage used as a criterion measure might vary for different content areas.)